

Cool Corals Become Hot Topic

New discoveries about deep-water corals have mobilized marine scientists to strengthen international collaboration and mitigate damage from fishing

When Robert Stone tells people he studies corals in Alaska, he gets some puzzled looks. “Everybody knows corals live in warm waters,” says Stone, a marine ecologist at the National Oceanic and Atmospheric Administration’s (NOAA’s) Auke Bay Laboratory near Juneau. “They think I’m joking.”

He’s not. While many scientists focus on understanding warm, shallow tropical reefs, a growing number of them are turning their attention to little-known “cool corals.” Researchers are using a new generation of submersibles and other technologies to probe the cold, dark waters of the deep ocean where these corals live. To their surprise, they have found remarkably vibrant coral gardens in the inky blackness and enormous deep-water reefs whose size confounds conventional scientific wisdom.

Next week, cool-coral experts from Europe, the United States, and Canada will gather in Ireland to begin crafting an international research plan to document the distribution, biology, and ecology of these unusual organisms. Along the way, they also hope to strengthen efforts to protect deep-water corals from fishing practices that threaten to reduce some ancient reefs to rubble.

Researchers agree that mystery enshrouds their subjects. “We know that these corals can be very old and very fragile,” says Anthony Grehan, one of the meeting organizers and an ecologist at the National University of Ireland’s marine institute in Galway. “But we have a lot to learn.”

To the untrained eye, cool corals look much like their tropical kin. They range in size, shape, and color from ivory cups no bigger than a thimble to crimson gorgonian fans 3 meters tall. Some build rock-solid edifices, whereas others are soft or leathery. But there are important differences. Deep-water corals can survive much colder temperatures—for instance, down to 4 degrees Celsius. And in living at sunless depths of up to 2000 meters, the corals lack the symbiotic algae called zooxanthellae that convert sunlight into energy for tropical corals.

Researchers believe that some cool corals sift their food from passing currents or peri-

odic “snowfalls” of dead plankton. But scientists know relatively little about how these corals evolved, reproduce, recover from damage, or interact with other sea-floor creatures. And climate scientists wonder if old corals can help them unravel ancient ocean conditions, much as tree rings provide clues to past weather. Scientists do know that deep-water corals grow very slowly—sometimes less than a centimeter per year.

In part because deep-water corals are hard to study, researchers showed little interest in early accounts of prodigious colonies of cool-water coral, including reports in the 1980s of extensive gardens along the U.S. and European coasts. A decade later, however, they took notice after Norwegian scientists announced the discovery of an enormous reef in 250 meters of water along the Sula Ridge, about 100 kilometers offshore. The 14-kilometer-



Coral fan. Researcher Robert Stone holds a find from Alaska.

long structure, composed mostly of hard, bristly *Lophelia* coral, rises up to 30 meters off the sea floor. Some of the corals appeared to be hundreds of years old, the researchers noted in papers published in the late 1990s, and the reef might date back several thousand years.

At about the same time, a French-led European team discovered vibrant coral gardens of *Lophelia* and other species growing 600 meters down atop huge, unusual sea-floor mounds off the coast of Ireland. “Even the most hard-bitten [researchers] were absolutely stunned,” says Grehan. “It was totally unexpected at those depths.”

Soon, researchers from Scotland to New Zealand were combing old data for hints of similar structures and launching expeditions with new, remotely operated submersibles to videotape previously inaccessible areas. They also had access to state-of-the-art multibeam sonar maps of the ocean floor that highlight humps, ridges, and sediment types that might be hospitable to corals. By the end of last year, such tools enabled the Norwegians to document an even bigger *Lophelia* reef (35 kilometers long), and British researchers found smaller growths atop mounds off Scotland. Canadian marine scientists discovered an exotic coral landscape on a 100-square-kilometer swath of sea floor off Nova Scotia. U.S. researchers hunted down their own treasures, including hauntingly beautiful colonies along Alaska’s Aleutian Islands that Stone began documenting last summer.

Increased knowledge also led to growing concerns about the impact of destructive fishing practices in deep waters, particularly bottom-hugging trawling nets. The Norwegians discovered that huge swaths of their *Lophelia* reefs had already been crushed by the nets, and they have barred trawling in several unspoiled areas. Canada created a coral preserve in 2001, and Ireland, the United States, and other nations are formulating similar plans.

But picking the right places for these reserves is a challenge, notes marine ecologist Les Watling of the University of Maine’s marine center in Walpole. “We’re still pretty shaky on basic distribution and abundance patterns,” he says.

Participants at the Ireland workshop—sponsored by NOAA and the Irish government’s marine institute—hope to fill those and other gaps by laying the groundwork for collaborative studies around the Atlantic. Both the United States and Europe have already poured more than \$5 million into cruises and studies, and agencies on both sides of the Atlantic have requested proposals for future work. The network may eventually spread to the deep-water corals in the Pacific.

An international conference this fall in Erlangen, Germany, is expected to produce solid plans for at least one major international coral cruise in 2004. Stone, meanwhile, would be satisfied if these meetings simply raise awareness that corals aren’t confined to the tropics. “I’d have a lot less explaining to do,” he says.

—DAVID MALAKOFF